The Michigan Antique Radio Chronicle

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A QUARTERLY WRITTEN FORUM OF THE MICHIGAN ANTIQUE RADIO CLUB

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Find it all at this year's Vintage Electronics EXTRAVAGANZA '17

July 13-15, 2017 in Kalamazoo

See the enclosed EXTRAVAGANZA '17 brochure for details

THE MICHIGAN ANTIQUE RADIO CLUB

The Michigan Antique Radio Club was founded October 19, 1985 at the Dillon Inn in Lansing, Michigan. Present at this historical meeting to found MARC were Jim and Brenda Clark, Larry Anderson, Karl Rommel, Mike Male, Dick Perry and John Kent. The purpose of the organization is to preserve the history and enhance the knowledge of radio, television, and related disciplines, with special emphasis on contributions originating in the state of Michigan. Dues for membership in M.A.R.C. are $25.00 annually (US funds) and payable in January. Officers of M.A.R.C. welcome your membership, your questions and your personal contributions to enhance the service value, growth and activities of the organization. Terms of office for Board members expire concurrently with the summer EXTRAVAGANZA meet held in Kalamazoo, Michigan. Send Correspondence to MARC, 311 Wordsworth St., Ferndale, MI 48220. E-mail: president@michiganantiqueradio.org. **Visit our Web site at** www.michiganantiqueradio.org.

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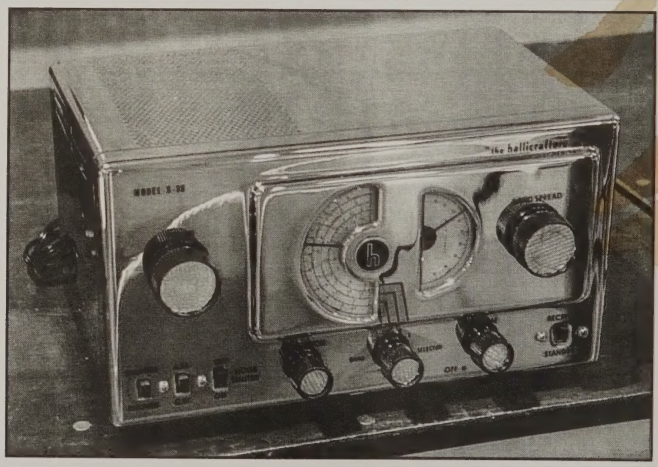


John Reinicke's chrome plated 1949 Hallicrafters S-38 will be the topic of his Thursday evening presentation at this year's EXTRAVAGANZA.

Perspectives

Spring turns to summer, and all eyes turn to Kalamazoo and Extravaganza. Sadly, Extravaganza will never be quite the same again.

As many of you know by now, we lost Don Colbert, rather unexpectedly, on April 26 of this year. Don was of course one of MARC's backbone members, and he and his better half Nancy were tireless volunteers and boosters of the club. We're all going to miss that steely gaze combined with that warm smile, his energy and his passion.

For myself, as a younger fellow joining the club, Don was someone to look up to. He showed me the ropes of managing crowds and the complexities of running shows. He gave me encouragement and correction as needed. He was a fount of wisdom and a teller of great tales. I will miss him more than I can adequately express.

But the show goes on. We hope to see you in Kalamazoo on the 13th, 14th, and 15th of July this year. Bring your family, bring your friends, and tell everyone about it! We're hoping for a massive turnout, and passing on the info in your local community really does help bring people to the show. All of the great attractions are there; our contest, two silent auctions, our big main auction (now featuring a reserve system) and the bargain auction at the very end. There will be a seller's drawing, our 50-50 drawing and possibly other fun contests where you can win great prizes. Plus, of course, all of our excellent sellers bringing their treasures for you to peruse and buy. We're always looking for new and different sellers, too, and since we've expanded our range to include all sorts of vintage electronics- record players, records, calculators, tubes, vintage computers and video games, telephones, microphones, test equipment, and more- spread the word to shops and people you know who sell these things, too. We'd love to have them under our big, climate-controlled roof with on-site food service!

We'll see you there, old friends and new, and have a great time.

Jeff

NOTES FROM THE SERVICE SHOP

No. 98

by John Reinicke

Decibel Examined

© 2017 by John Reinicke

"Not bad at all!" I was thinking as I walked down the steps from camping out in the former apartment above Ken and Betty's Antique shop. The aroma of Betty's robust coffee helped clear the morning mental fog and by the time I was on the steps I was looking forward to joining them for breakfast. It was Ken's turn to pick up breakfast goodies and I brought yogurt in my cooler. When I reached their back room things were already set up and Betty was pouring coffee. For years I have enjoyed Betty's coffee because she has found a delightful combination of dark roasted coffee with just the right touch of chicory and a hint of hazelnut.

We all enjoy these morning exchanges of family gossip and tales of our grandchildren and this morning was no exception. After exchanging family information, I asked how their business had been going. They commented on the ever-changing tastes of their customers and trends in the business and on the need to promote and sell on social media. It was Ken that noted that almost all of their new customers dealt with them via their smart phones. He also commented those customers have a wide variety of tastes and that has expanded the diversity of what they sell. Betty added that had made them take on new perspectives in their searches and made them better pickers.

"We now find ourselves going to some industrial and commercial sales in addition to our traditional estate and barn sales. And even at the barn sales, we are picking up stuff that we used to regard as trash." Betty could see the look on my face, and before I could ask, she continued. "For example, last month we bought a stack of rusty corrugated steel sheets – you know, the stuff that is used for barn roofing and industrial siding. I had a customer that had been looking for it and when I saw the pile I snapped a shot with my phone and sent it off to him. It was exactly what he wanted and within a few minutes I had made arrangements to have it shipped to him."

I laughed, "So now you deal in scrap steel. I would think that is a big step from fine furniture."

Betty gave me a knowing smile. "I know what you are thinking, but trust me, when you can pick up something for scrap prices and sell it as exotic architec-

tural detail material at a commensurate exotic price, you can make a handsome profit even with the cost of shipping. I must say it was funny to see the expression on the shippers face when I insisted that all those sheets of rusty steel had to be separated with foam sheets to protect the "patina". My customer was delighted when it arrived and I was delighted with the check. And the check wasn't even a check – he paid with a transfer on Pay Pal."

Ken nodded in agreement. "My find of the week was a lot smaller." He held up a black, two double A cell, LED Maglite flashlight.

My response was a "Huh! There has got to be a story to go with that."

"Indeed there is!" He responded. "I had been carrying this around on all my picks for years and then one day it disappeared. I looked in all the places I could think of and finally gave it up for lost. I finally bought a new one and have been using that for some time. The other day I dropped my house keys between the seats in my truck. To retrieve the keys, I moved the driver's seat all the way forward, and there it was. I retrieved the keys and my long lost trusty flashlight.

"Unfortunately riding around in a hot truck for some time resulted in the batteries slobbering all over the inside and then the heat dried the slobber into a solid mass. The batteries were really stuck in there."

I nodded in mock sympathy. "And you didn't simply throw it away? Those things aren't all that expensive after all."

Ken gave me a bit of a dirty look mixed with a smirk. "True, but a new one wouldn't be this faithful companion of hundreds of picks. I just had to see if I could get it back in trusty service."

I grinned. "And the REST of the story.....?

"WELL (a fair Jack Benny) the first thing I tried was simply banging it battery side down on a block of wood to no avail. I thought about it for a few minutes and came up with a brainstorm. I took a really long drill bit and bored a hole in the back of the first battery. I figured this would be a really bad idea on a fresh battery since it would result in a short that would explosively expel caustic crap. Since these batteries were clearly quite dried out I decided to risk it. I happened to have some three and a half inch deck screws and I threaded a screw into the back of the battery. I used the nail extractor on a wonder bar on the screw head to pry out the first battery and repeated the trick on the second battery. To hold the flashlight, I found I could just catch it under the lip of the jaws in my vice. That way I didn't have to clamp and distort it. With the batteries out, to remove the remaining guck, I soaked the whole thing overnight in soapy water. After the soak I scrubbed the inside with an old toothbrush. After it dried, to my surprised delight, it worked good as new." To make his point, Ken pulled the flashlight from its holster, turned in on and held it up next to his head like you see the cops do on those TV shows.

We both got a chuckle out of his performance. I laughed and responded; "I still think you're crazy!" I could see Betty nod with a knowing grin.

By this time we all agreed it was time to get to work, Ken and Betty opened the shop for the day and, with a fresh cup of coffee, I made my way to the attic. At the front of the attic, I opened the windows to let in fresh air and abundant sunlight and settled back in the chair next to the roll top desk to read from the diary

and logbook of Clemens Mettmann who had operated the Centerburg Radio and TV shop in the building in the decades past. I stepped back in time to the middle 50's.

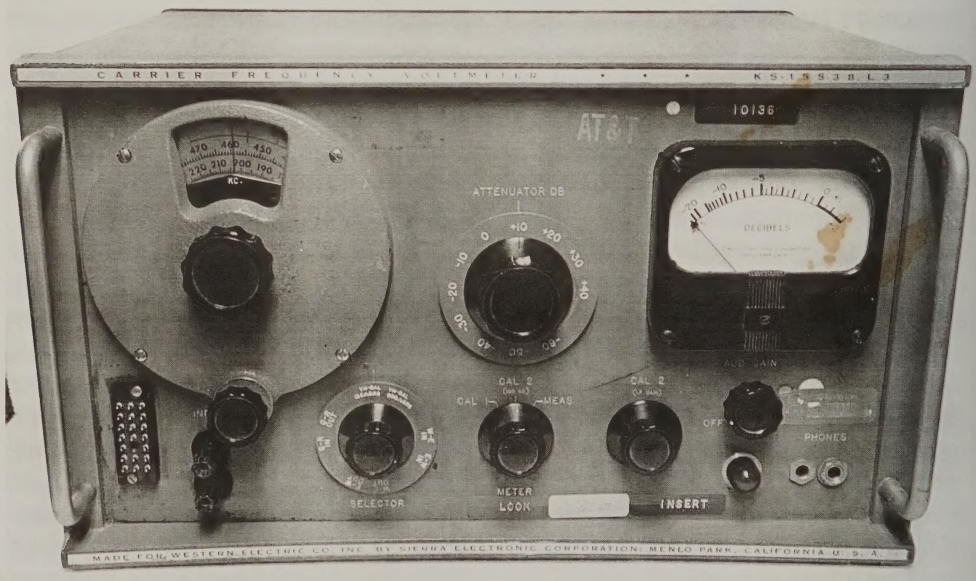
Art was busy at his bench with what was clearly a kitchen radio. The white Bakelite Philco had a uniform coating of rather sticky grease – the common denominator for a kitchen radio. The hum indicated a bad filter cap so he did not expect a lot of time would be needed for the repair. He muttered in a non too soft stage whisper, "Dang, I wish this gunk didn't get all over the inside and chassis." He could hear a dirty chuckle from Gerry's bench.

Gerry was hard at work on a two-way radio as he spoke up. "I am only too happy to let you work on kitchen sets. That fry grease gets everywhere and can be quite unpleasant, particularly if the lady of the house is a smoker as well. At least the outside gets wiped off once in a while, but the inside, is usually quite another matter. On really bad ones, I will use a rag soaked in a little denatured alcohol to clean the worst of it. At least that makes it better to handle."

Art smiled. "Can't hurt – I'll give it a try." With that, Art grabbed a rag, added a dab of alcohol from a can on the shelf and proceeded to wipe it off.

"You're right, it does help." Art observed as he applied some elbow grease.

They could both hear Clem in the main showroom. "Thanks George, I will get right on it and I'll give you a call later, say around lunch time." A couple of seconds latter, Clem walked into the shop carrying a rather large light gray box. The cord emerging out of the back and name-tags on the back indicated it was some type of electrical apparatus. Clem carried it over to his bench and set it down carefully. He loosened two large, captive, thumbscrews on the back and slid the chassis out of the case. Art and Gerry were watching with some interest. Gerry

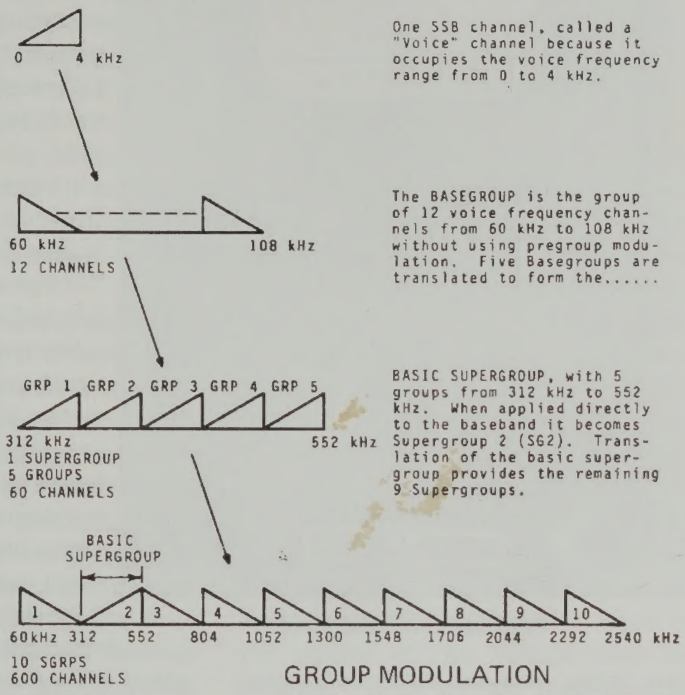


A Frequency Selective Voltmeter

was the first to let his curiosity get the better of him and he walked over to Clem's bench. Art was just behind. On the top left of the front panel was a large tuning knob and dial. The very center of the front panel was a knob labeled 'attenuator' with steps from -60 to +40. The top right featured a good-sized meter calibrated in decibels. Across the bottom were a multi-pin male plug, banana jacks labeled input, a selector knob, two knobs labeled 'calibration', a knob labeled 'audio gain' and below that a pair of phone jacks.

GROUP MODULATION

The process, in SSB multiplexing, in which a number of voice channels, separately modulated to a specific frequency range, are modulated again to shift the group of channels to another frequency range.

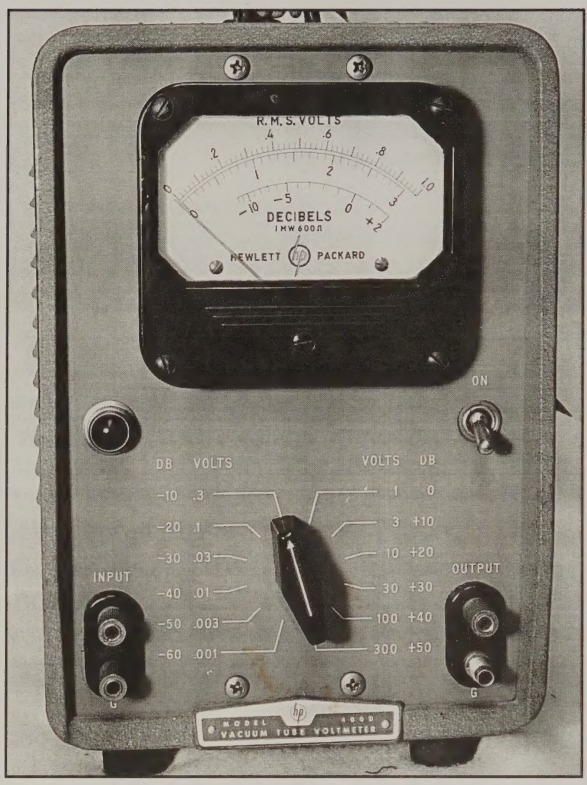

0 4 kHz
One SSB channel, called a "Voice" channel because it occupies the voice frequency range from 0 to 4 kHz.
60 kHz 108 kHz
12 CHANNELS
The BASEGROUP is the group of 12 voice frequency channels from 60 kHz to 108 kHz without using pregroup modulation. Five Basegroups are translated to form the.....
GRP 1 GRP 2 GRP 3 GRP 4 GRP 5
312 kHz 552 kHz
1 SUPERGROUP
5 GROUPS
60 CHANNELS
BASIC SUPERGROUP, with 5 groups from 312 kHz to 552 kHz. When applied directly to the baseband it becomes Supergroup 2 (SG2). Translation of the basic supergroup provides the remaining 9 Supergroups.
BASIC SUPERGROUP
1 2 3 4 5 6 7 8 9 10
60kHz 312 552 804 1052 1300 1548 1706 2044 2292 2540 kHz
10 SGRPS
600 CHANNELS

GROUP MODULATION

"OK, boss, that is a really interesting, but what exactly might it be?" Gerry asked, clearly with interest.

Clem smiled. "Strictly speaking, this is called a frequency selective Voltmeter. It is really a specialized superhet receiver with a calibrated meter on it's output. In a lot of ways, it is like that TV level meter we use when we put up television antennas. Our meter has a VHF tuner and voltmeter so we can pick a TV channel to be sure we have enough signal for a good picture. This meter tunes from 20 to 600 kilocycles – same idea, just a different band. As you can see, it is somewhat more complicated and designed for specialized application.

"This instrument is used by the telephone company to check signals on their cables and microwave systems. Long distance phone circuits use single sideband signals for the individual channels and the channels are stacked up and sent across the country on coaxial cables. In the past few years, more and more, are transmitted by microwave. Each phone channel is four kilocycles wide, and the bandwidth available on the cable and repeater amplifier system for the big cross-country trunks is on the order of 6 megacycles. So each cable can carry one television signal or 1200 phone channels. To serve smaller offices, the coaxial system can handle 120 channels in a 500 kilocycles bandwidth. Each cable is really



Wideband AC Voltmeter

two cables, one for eastbound signals and one for westbound signals. By convention, since the country is bigger east to west than it is north to south, the cables are labeled east bound and west bound even though the cable may actually be going more north and south. Each of those individual telephone channels need to have their levels set to exactly the right value and this instrument is used to tune the individual channels.

"This week end, AT&T is updating their coaxial cable here in Centerburg. Normally they would send their test equipment back to their own laboratory for repair and calibration but the cutover has been scheduled for some time and when this meter stopped working, they didn't want to postpone the cutover so George brought it here. We are both hoping I can get it going this morning. Since even really sophisticated equipment can have bad tubes and parts, I am hopeful the problem will be simple. Of course, anytime, you replace a part, it should be checked and recalibrated. I am hoping that won't be necessary, but we shall see."

Art was studying the front panel. "How do you plan to check calibration?"

"George also dropped off a wideband AC Voltmeter that has been calibrated. I will use one of our signal generators and use both meters to simultaneously measure the output at several frequencies. If they agree, all is wonderful. If not, hopefully a simple tweak will do."

Gerry was also looking at the front panel. "This meter is calibrated only in decibels. When you check calibration, how will you know what the measured Voltage is?"

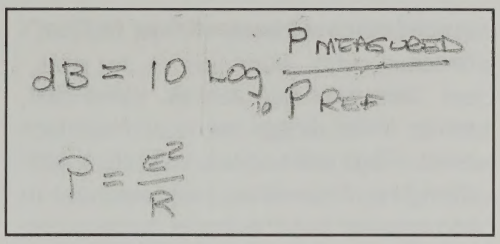
Clem's face took on a bit of a frown, and then he snapped his fingers. He walked over to one of the shelves and looked around for a few moments. "Ha, there you are!" He reached to the shelf and extracted a slide rule and held it up. "For that, I will have to use this and a pencil and paper."

Gerry's face took on a knowing look and Art simply looked puzzled. Clem could see the reaction and smiled. "Don't feel bad Art, decibel measurement has proven to be confounding for radio mechanics for years. I even know some engineers who can have difficulties at times. We can all blame good ol' Alexander Graham. As you may recall, Bell started his career working with the hard

of hearing. He was looking for a way to measure how well we hear and discovered that the human ear has a logarithmic response to sounds, so the unit of measurement was named for him. As it turns out, the Bell is quite a small unit and, for practical measurements, we multiply the unit by ten. Hence, we use the Bell multiplied by ten or decibel. That is just the beginning of the confusion since the measurement is not based on an absolute reference but a ratio instead and to compound that, it is logarithmic."

Clem produced a sheet of paper and a pencil. "The decibel is defined as 10 times the base 10 logarithm of the ratio of two powers. That means, in order for the measurement to make any sense, the measured power must be compared to a reference power. The phone company settled on a reference power of one milliwatt. This is the nominal output of a telephone transmitter, or microphone if you prefer. Thus, this measurement becomes 10 times the log of power over one milliwatt. So, if the measured power is one milliwatt, the ratio would be one and the log of 1 is zero. Thus, zero dBm equals one milliwatt. If the power is 10 milliwatts, the log of 10 is one and ten times that is 10. If the power is 100 milliwatts, the ratio is 100 and the log of 100 is two. Two times 10 is 20 so 100 milliwatts is equal to a positive 20 dBm.

"Going the other way, if the power is a tenth of a milliwatt, the ratio would be point one - one tenth. The log of point one is minus one and ten times that would be minus 10 or a negative 10 dBm. Continuing our previous thinking, one one hundredth would be minus 20 dBm. For numbers other than even powers of ten, I will use my trusty 'slip stick'." Clem held up the slide rule.



Clem's Notes

"Since the unit is logarithmic, multiplication becomes simple addition and subtraction so losses are negative and can be subtracted and gains are positive and can be added. It does make transmission calculations straightforward for the AT&T engineers. However, for us radio mechanics, it does add another layer of ...." Clem paused. "Shall we say confounding confusion? The problem is that we want to measure power but the instrument actually measures Voltage. Since we want to know the power level that means we also need to know the load resistance since power is equal to the square of the Voltage over resistance. Since we are measuring on transmission lines, that load resistance has to be equal to the characteristic impedance of the line. When the dBm was invented, phones were connected to open wire lines or twisted pair cables that had an impedance of 600 ohms. So, if you think in terms of that, the voltage for one milliwatt would be equal to the square root of 600 times one one thousandth and that comes to 0.775 volts."

Clem could see 'the light bulb going off' in Art's head. Art walked over to his bench and looked at the meter on his bench. He muttered under his breath, "Well look at that, the zero on the dB scale does line up with 0.775 Volts on the AC scale and there is a small note that says dBm across 600 Ohms." Art looked

up and returned to stand next to Clem's bench.

Clem gave him a wink. "And that, mister Miller, brings me to an important point. That scale only is valid for a 600-Ohm line. Remember, I said we want to know power but the meter is measuring Voltage. The coaxial cable AT&T uses is 135 Ohms. The RG8 you hams use is 50 ohms. Television twin lead is 300 Ohms and the RG59 we use for television coax is 75 ohms. So, if we want to know the power, we need to make a correction to the reading. So, for example, that 0.775 Volts on a 135 Ohm line would be ... " Clem wrote the numbers on a sheet of paper and deftly slid his slide rule. "0.775 squared divided by 135 equals 4.45 milliwatts or 6.5 dBm. Now remember, I said the beauty of decibel measurement is that you can simply add and subtract. So that 6.5 dB becomes a correction factor and if you are measuring on a 135-ohm line, you can simply add 6.5 to any measurement.

"If you think about it and do a little math, you will discover the log of the ratio of the impedances times 10 becomes the correction factor. So if you take the log of 600 divided by 50 times 10, the correction factor for 50-ohm cable would be 10.8 db. Thus, you simply add 10.8 to any measurements made on a 50-ohm line. You can do the same math for any impedance and simply correct the reading."

Clem put his hand on the selective Voltmeter. "You will notice the multi-pin connector on the front. At the toll station the cable connections are already made such that the meter needs to simply be plugged in to make the level measurements."

Gerry held up a finger. "Just like my Motorola test set plugs into a mobile radio. I don't have to go looking and probing for test points."

Clem nodded. "Quite so, Gerry, quite so. The meter is already set up to make the 6.5 dB correction for the 135 ohm cable and, as you can see, the selector lets you quickly switch between east in and out and west in and out. There is also a pair of positions for a 600-ohm carrier cable. To make the instrument useful in the general case, there are a pair of jacks that can be connected to conventional test probes. On those jacks, you can set it for 600 Ohm or 135 Ohm measurements."

Clem paused for a moment to let it sink in. He put his hand on the meter and commented, "I would like to continue this discussion, but I really had better take a look at this guy."

Clem went to work on the instrument. It did not take Clem long to realize there was no response on the meter at all. The 100-kilocycle reference oscillator would not cause movement, nor would an input signal. The B plus was fine, so Clem decided to check tubes. He started with the 6J5 meter amplifier tube and, as they say, he got lucky. The first tube he tested was quite dead. Clem was thinking; "I hope our replacement is good enough for this high class meter," as he retrieved a replacement from the shelf. With the new tube in place the meter came to life. "Man, I wish all repairs would go that way," he said softly to himself.

Gerry overheard the comment from his bench. "Done already, Boss?"

"I just might be! I am going to let that tube settle in for a few minutes and then I'll check calibration. It looks like I might be able to call George quite a bit before lunch. I know that will make him happy."

Art heard the exchange from his bench. "Mister Mettmann, can I ask you a question?"

Clem had a broad smile. "Of course."

"I enjoy doing math in school but I never expected that it would be so useful for radio mechanics. What made you so smart about decibel measurement?"

Clem nodded with a grin. "You know, Art, no matter what you do for a living, you had better plan on taking on new things. I have always been interested in this stuff, but learning about decibel measurement was the result of a job we will all be taking on starting next week."

Gerry looked up from the set on his bench. Clem could see he had their attention. "You know Dick and Mary Findley – they run the Sleepy Oaks Motel on highway 36 north of town. They decided to be competitive they had to offer television sets in the rooms. Their house is behind the office and we put up an antenna for them a few years back. They get good reception on all three channels we get here in Centerburg so I figured we could make use of the existing tower and antenna installation. I did mention to Dick that he would have to give up his television DX activity and do without the rotor. We will point the existing antenna at channels 4 and 10. I am planning to add a separate antenna for channel 7. The down leads can be combined on the tower.

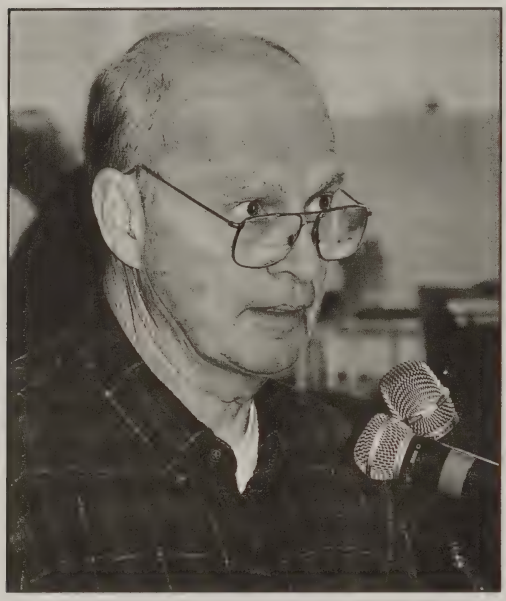
"The calculations come in because there are a total of 20 rooms, 10 on either side of the office. The end rooms are some 200 feet from the office. With those neon lights along the front edge of roof over the walkway in front of the rooms, I figure we will have to run coax cable for the trunk and the taps, The balun transformer to go to 300 Ohms will be right on the antenna connection on each set. As you know, cable losses are expressed in dB per hundred feet. Splitter losses are expressed in dB and the 'isolation' rating of the taps from the trunk are expressed in dB. The taps also have what is called 'feed through loss' which is expressed in dB. Once you add up all the losses in your 'signal budget', you can figure out how much amplification is required.

"To figure out what was needed, I used the information in the Jerrold catalog. From our experience installing antennas here in the county, we have used our test receiver to know the relative signals of the three channels just about anywhere in the county. We know that a good, snow free, television picture requires on the order of 1000 microvolts at the input to the TV set. As it turns out, Jerrold has defined this level as zero dBj. So zero dBj is 1000 microvolts on a 300-ohm line. In case you wondered, that would be minus 55 dBm. Yesterday I checked the signal at the Findley's television set. Channel 7 was the weakest at 2000 microvolts so it would be at plus 6 dBj. Channel 4 was the strongest at 8000 microvolts or plus 18 dBj.

"To reach the end television from the center you have to take into account all of the losses along the way. Each of the taps has a 0.25 db feed through loss for a total of 2.5 dB. 250 feet of cable has a loss of 12 dB at channel 7. The splitter has a loss of 3 dB. The isolation loss would be 14 dB. All of this is at channel 7's frequency. So the total loss is 28.5 db. If we figure on a minimum of a 6 dB margin to allow for tube and component aging that means we have to have a plus 35 dBj input to the distribu-

(Continued on page 24)

In Memory of Don Colbert



20 plus years ago when I first joined MARC, Don and Nancy Colbert were two of the first members I became acquainted with. They were both among the friendliest and most welcoming people in the club. As a tribute to Don, we asked MARC's two past presidents to share their thoughts. — Steve Enzer

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The passing of Don Colbert was a moving loss to all of us. And by all of us, I mean the extended community beyond radio collectors. Of all of the club members, none were more dedicated to the success of the club or more effective in promoting that success, than Don. Don served a number of roles, some formal, such as Vice President or Membership chair, and some on a real time basis as required. Don never sought recognition and simply saw what needed to be done and got it done. Don was always ready to help out and did so with good humor, humility, and compassion. Don could also deal with a situation with an iron will if needed.

Don was genuinely interested in the hobby and would share his outlook with fellow collectors. He could be outspoken and always had the best interests of the club at heart.

Don, I do think that most club members really have no idea just how extensive your contributions to the club were. We are all going to miss you and your contributions even as we know that you will always be with us.

John Reinicke

In preparation for our 2nd annual EXTRAVAGANZA back in 1987, we had invited George Wedemeyer of Ann Arbor, MI (who started in the radio business back in the 1920s) to speak to the attendees. George built and sold about 150 radios in the mid-1920s and it happened that the Henry Ford Museum in Dearborn, MI had the only Wedemeyer radio known to still exist. We learned about the existence of this radio from Don Colbert. He took it upon himself to contact the appropriate people at the Museum and convinced them to entrust him to take possession of the radio for a few days in order to bring it to our convention. The moment Don set his eyes on the Wedemeyer radio, he discovered one of the tuning condensers & knobs was broken. Don set out in the EXTRAVAGANZA flea market to find a replacement ...and not be denied, he did so! We had not told George Wedemeyer that one of his radios would be on-hand...and he was overwhelmed to see it. Also, when the radio was returned to the Museum the following week, MARC received a very nice "thank you" note from the Museum in appreciation of our interest in this artifact and also of the effort made to enhance the radio upon its return.

This is perhaps one of the earliest examples of Don Colbert's contributions, too numerous to mention, to MARC. Frankly, I'm not exactly sure why Don (& Nancy) decided to give their unabashed support to MARC over the next 30 years...but I myself and many others will be forever grateful. Here are just a "few" of the things that Don did for MARC: he served on the MARC Board; with Nancy for many years hosted our Fall MARC meets in Dearborn; oftentimes oversaw the outdoor flea market at EXTRAVANZA; did seminars at EXTRAVAGANZA; provided entries in many of our equipment contests; purchased many hundreds of dollars of raffle tickets at our events; ran our Donation Auctions for a time; kept the MARC membership data base; and printed out EXTRAVANZA name tags for many, many years. When Don saw a need, he jumped in and helped. In recognition of his contributions, along with Nancy, up to that point of MARC's existence, in 1998 we announced the creation of "The Don & Nancy Colbert MARC Volunteer of the Year Award", thereafter commonly referred to as "The Colbert Award" (of which there will be a full listing of all the winners of this award in the upcoming Fall newsletter). However, there was nothing "common" about Don. With his recent passing Brenda & I have lost a true friend...and his loss to MARC will be irreplaceable. Nancy, thanks for sharing him with us for all of these years. MARC is certainly in a better place because of him...and you.

Jim Clark

Servicing AM/FM Radios

By Edward Dupart

The popularity of AM/FM radios has increased lately so I was asked to do an article on repairing AM/FM radios. Most articles/discussions have focused on AM and short-wave radios and the AM/FM radios have been pretty much left out. I'm going to stay away from math and one really doesn't need vector analysis to fix an old tube AM/FM. Most readers simply want to know how to fix this stupid thing that doesn't work. Some basic assumptions will be made: One, all the paper capacitors and electrolytic capacitors have been changed or checked. Two, all the tubes are good. I will be doing this analysis stage by stage.

Some early AM/FM radios actually had two separate radios with a common audio amplifier that could be on one chassis or two chassis's. This was true of both tube and transistor units but this was not the norm. Generally the FM portion had its own tuner with an optional RF amplifier, 2-4 IF stages with two being the most common and one IF stage shared with the AM section. This cut down on cost. The FM section used either a ratio detector or a Foster-Seeley detector/demodulator that required a limiter stage that reduced or eliminated unwanted AM interference. The output from the detector went into a common audio amplifier that would switch between AM and FM. The AM portion had its own separate tuner with an optional RF amplifier that fed into 1-2 stages of IF amplification, with one stage being the most common and shared with the FM section, again to save costs. The AM detector usually consisted of one diode, tube or crystal and that fed into a common audio amplifier. There were a few radios that used a common converter tube, 12BE6/6BE6 comes to mind, for both AM and FM, but I consider that the exception.

A word of caution when working on the FM section: the wiring is short and direct, the tuning coils are wound with heavy wire. Squishing or expanding the tuning coil will change its resonance and will give you headaches in trying to get it back in alignment. Unless you are a pro, don't mess with the tuning coils. Don't move the wiring around unless you really have to and if you do, put it back in its original position. In AM radios the wires can be moved around, coils can be messed with somewhat and the radio will probably still work. Things just aren't that critical working with AM frequencies but it's a different ball game when working with frequencies well above 50 MHz.

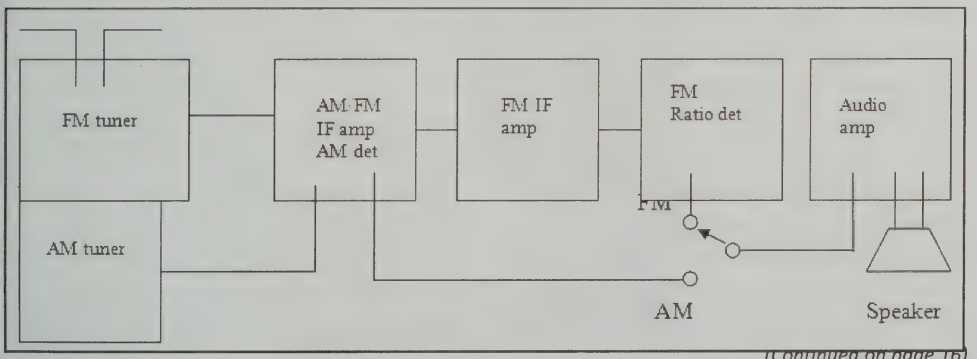
The first stage is the RF stage and is optional. Its function is to improve sensitivity, image rejection, reduce local oscillator radiation and increase selectivity. Sensitivity is the ability to pick up weaker stations. If the RF stage is tunable then it helps reduce image rejection, which is the possibility of picking up the same station twice, but in different spots on the dial. The local oscillator can act as a transmitter and interfere with nearby radios and the RF stage tends to reduce this problem. Selectivity is the ability to reject the interference of stations adjacent to the one you are tuned to. A strong station can bleed into an adjacent weaker station and the RF stage helps to

eliminate this problem. Cheap radios may not have an RF stage and some may not be tunable. From a technician point of view I like RF stages.

What kinds of problems does a faulty RF stage cause? Usually a loss of sensitivity, not picking up stations or only a strong one or two and the first thing to check are the voltages on the RF tube. A lack of a voltage indicates the possibility of a bad resistor or a shorted screen grid bypass capacitor or other B+ bypass capacitor. If all the voltages and capacitors check out there is the possibility that the alignment may be off if it is a tunable RF stage. If there is a station coming in around 106-107 MHz then adjust the RF trimmer on the tuning capacitor for maximum volume. To determine which section of the tuning capacitor is for the RF stage, trace the wires from the tuning capacitor and one will go to the RF section, one to the mixer section and one to the oscillator section. Mica and ceramic capacitors are very reliable, but I have had them go bad and they can cause weird problems in RF circuits. In the case of RF amplifiers I have had ceramic coupling capacitors open up and so no RF would get to the mixer circuit resulting in weak reception or no reception.

In a FM tuner where there are separate tubes for the mixer and oscillator, the mixer usually doesn't create many problems, but the usual problem is a weak or no signal. Check for low or missing voltages and like the RF stage, check the resistors and bypass capacitors. For a tuner that has the mixer and oscillator combined in one tube the above problems could still hold true and use the same checks.

The oscillator stage can have some unique problems and is the trickiest stage in the FM section of the radio. If you are experiencing weird problems and you believe it is in the oscillator, try different tubes. I have had new tubes not work at high frequencies and I have had tubes check good that don't work at high frequencies. So make sure tubes are not an issue. One of the problems I have encountered is losing the high end of the band while stations at the low end of the band come in just fine. This is usually due to low voltages on the plate of the oscillator or the tube itself, which is a common problem with the Zenith Transoceanic using the 1L6 converter tube. When the 1L6 starts to get weak the high short wave band goes first then the low short wave band then the upper part of the AM is gone. If the voltages and the tube are good, then make sure the tuning capacitor is clean and there are no plates touching. If the tuning capacitor checks



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out then it's time to check all the resistors, ceramic and mica capacitors. Hopefully, one of these suggestions will take care of it.

If the oscillator is not working at all, the FM section will appear to be dead. To check a FM oscillator to see if it is dead, place another functioning FM radio next to the one you are working on. Tune the working radio to a weak station and then tune the non-functioning radio across the dial. If the oscillator section is working it will beat against the weak station and produce a squeal or even block the station out all together. If no interference is detected, then there's a good chance the oscillator is not working. Do all the checks for the weird functioning oscillator listed above.

The next section to look at is the IF section and in most AM/FM's of the 50's-60's they have two IF amplifiers for the FM section and one IF for the AM section and one of the IF stages being common both to the AM section and the FM section. Other than an occasional screen grid resistor or B+ supply resistor opening up or a shorted bypass capacitor, the IF section has rarely given me any real problems, unless it is a Zenith.

Zenith long noted for its quality did have an IF transformer issue in the 50's to 60's. The transformers would cause a cracking, snapping, popping noise due to the mica capacitors that are internal to the transformer breaking down. Usually people remove the bad mica capacitors and replace them with a ceramic or mica capacitor and then re-align the IF stages. If the radio is not receiving anything, basically dead but you know the audio is working then I definitely won't overlook the IF stage that is common to both the AM and FM bands. An RF generator is an excellent choice for checking the IF stages. The vast majority of radios use 10.7 MHz for the FM band and 455KHz for the AM band. Set the generator at the desired frequency and connect it to the input of the IF stage and if the IF stages are working, just getting near the input will produce an output. If the AM/FM IF stage is dead, check the resistors and bypass capacitors, usually the resistor will open up and the bypass capacitors shorts out. Occasionally, I'll run across an open plate winding on the AM IF transformer, which would render the entire stage dead. If you are lucky, you might be able to open up the IF transformer and repair the break in the winding and many times it is at the terminal. I generally solder a solid wire to the terminal and solder the broken winding wire to the solid wire. I use the solid wire to extend the length of the terminal. The reason the winding wire usually breaks at the terminal is that the winding wire wasn't long enough to begin with and over time the stress breaks the wire. Again, this is one of the more reliable stages in the radio.

A stage that resembles an IF stage is called a limiter stage and its job is to clip the peaks of the incoming signal and removes all AM modulation, which means this stage eliminates or reduces greatly lightning noise, electric motor interference, bad ignition systems on vehicles and other AM interference. This stage is used with the Foster-Seeley detector developed by Dudley E. Foster and Stuart William Seeley in 1936, but not with the ratio detector stage. The limiter uses low screen and plate voltages and may have a grid leak composed of a capacitor and resistor that will establish a negative bias on the control grid or it can have a large

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Arthur Godfrey was Company for Sick 13-Year-Old

By Brian Rogers

In December 1950, shortly after I turned 13, I got pneumonia. Antibiotic use was limited then, and my parents said I nearly died.

But, even after the worst was over and I was recovering, I was confined to bed. My parents both worked during the day; and, for three months, I had nothing for company weekdays except the Philco cathedral-shaped radio by my bed.

The highlight of my day came at 10 a.m. when *Arthur Godfrey Time* began its daily broadcast. Through the Philco's speaker came Godfrey's warm friendly voice that entertained me and made me feel he was right there, sitting next to my bed and chatting.

Arthur Godfrey had been born in Manhattan in 1903. The oldest of five children, be began working after school at age 12 to help support his family, which by then had moved to Hasbrouck Heights, New Jersey.

When he was 15, he quit school to work full time. He drifted from job to job, then lied about his age to join the Navy at age 17. Trained as a radio operator, he spent four years in the Navy with later service, also in radio, in the United States Coast Guard.

He left the service in 1929 and got a job as an announcer at WFBR in Baltimore. Doing double duty, as did many radio people then, he was also *The Warbling Banjoist*.

A few months later he moved to WRC in Washington, DC.

Godfrey had loved flying for a long time; and, in 1931, while he was driving to a flying lesson, an oncoming truck hit his car head-on. He wasn't expected to live.

According to writer Jim Ramsburg, "his pelvis was broken in 27 places, his right hip was smashed, his left hip permanently injured, both kneecaps were smashed and he had a collapsed lung."

Sheer hard work and determination made it possible for him to walk, albeit with a limp he carried for the rest of his life, back into WRC several months later.

He was a different radio performer after the hospitalization. During his months of confinement

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How to Identify Unknown Radios

By Marc Oppat

Radio collectors often find radios that have no brand name or model number markings and want to identify them and know the year of manufacture. Over my 40+ years of collecting I have learned several techniques on how to do this. Lets dive in....

First, its helpful to know the era of the radio, so you might know the makers that were active at that time. The style and type of cabinet will give you clues. Here are some tips... years listed are "model years" which mean the unit may have been sold up to 4 months before the earliest year listed:

FIrst, table radios...

Long wood box with flip top lid and Bakelite panel = 1922-1927
Metal box, usually with removable lid, separate speaker= 1927-1929
Table radio, taller than wide, arched top ("cathedral")= 1930-1937
Table radio, wider than tall, mostly flat top, =1933+
wood radio, small,= 1933+
Bakelite (brown or black plastic only, sometimes painted= 1935+
Colored plastic (Plaskon, Catalin, Beetle Plastic, etc)= 1937+
small portables with handle= 1940+

Now, Console ("floor model") radios

Wood console cabinet with doors on tall legs ("high boy")= 1928-1932
Grandfather clock with radio= 1930-1933
Wood console with short legs= 1933-1938
Console radio with curved corners, no legs= 1935-1947

Next, we can identify the era of the radio by the types of tubes in it. Note that tubes made before 1933 may have prefixes such as UX-2xx and CX-3xx so a type 26 can be a type UX-226 or CX-326, etc. Also, some makers would use tubes for years after they were popular. For instance, Philco kept using "large pin" tubes (types 41, 42, 84, etc) for several years after the "octal" tubes came out. Same for smaller makers. Also, during the 40's when there were parts shortages due to the war and large consumer demand afterwards, radio makers shuffled different tube types thru their sets to keep the production line rolling. So a radio could have used a 7B6 or 6AV6 or 6SQ7 in the same position in the radio but each one had a different socket type. Sometimes these changes were noted in the service info, sometimes not. Here is a basic list of popular tubes and when they were mostly used:

"Large pin" type tubes

26, 27, 71A, = 1928-29
24A, = 1929-3135 = 1930-33
55, 56, 57, 58, 59 = 1933-1935
37, 38, 39/44, 41, 42, 43, 46, 47, 48, 49 =1933-37
75, 76, 77, 78, 6C6, 6D6, 6A7, = 1934-1937
If you have a type 59 in your radio its most likely a Crosley or Zenith.

"Octal tubes" (have black key in center with 8 pin positions around it)

5Z4, 6A8. 6K7, 6H6, 6F5, 6F6, 6Q7, 6L7, 6C5, 6J7 (all original metal tubes)= 1936+
Note: These metal octal tubes were introduced by RCA/GE and Westinghouse and used by them and many other makers such as American Bosch, Crosley, Wells-Gardner and others. Silvertone and a few others had their own "tall metal" tubes made by Arcturus and Ken-Rad for a short while.
Tall glass equivalents of the above, such as 6A8G, 6K7G, etc,= 1936+
Shorter glass equivalents of the above, such as 6A8GT, etc= 1939+
Note that Philco never used a metal tube, and Zenith did not before WW2, maybe not after WW2 also, but not sure. Some makers like Wells-Gardner offered either to their clients.

"Loctal tubes"

Metal band around base, metal center key, type numbers begin usually with "7" for the 6 volt filament tubes, "14" for the 12volt filament types. Can also begin with a number 1, 3, 5, 35 or 50. These tubes were introduced in late 1939 and used thru about 1952, mainly by Philco but also Zenith and others. Note: RCA, GE and Westinghouse NEVER used a Loctal tube as it was Sylvania's patent.

"Miniature" tubes

These have no base, just the wire pins come right out of the glass.
7 pin versions like 1R5, 1u4, 1U5, 3V4, 3S4 = 1940-1958
9 pin versions like 12AT7, 12AU7= 1947+

Tuning Eye Tubes

These were introduced in the 1936 model year by RCA. Types 6E5, 6G5/6U5, 6N5/6AB5, then in 1938 types 6AD6, 6AF6 and others. Zenith and others used eyes from 1938 to 1941 mainly. Philco NEVER used a tuning eye, but had "shadow meters". Other makers like Crosley and Sparton used shadow meters and other tuning indicator tubes. Other eye tubes appeared after WW2 for AM/FM uses.

OK, so now that we might know WHEN a radio was made, lets look more at WHO made it. During the 1920's there were MANY small makers, way too many to list. The

top seller was Atwater-Kent, followed by RCA, Freshman, Grebe, Crosley and others. So those are your top picks up to 1930. Most of those battery powered radios of the 20's had their names etched into the front panel or had decals applied. But there were many "home brew" sets made from parts available "over the counter" at radio parts stores. It can be impossible to figure out who made such radios as most were not labeled.

The AC powered radios came out in 1928. Atwater-Kent introduced the Models 37, 38, 40, 42, 44 and 46. RCA had the long wood box models 17 & 18. All of these had separate speakers for the table models. Then 1929 was a banner year for most makers, so LOTS of radios were made that year, most being consoles. The big sellers were the Atwater-Kent Models 55 and 60, the Majestic 70 and 90 consoles, and the RCA Radiola 60 series. Philco came along in 1929 and dominated the market from 1930 to 1950 or so, an amazing feat. They basically drove Atwater-Kent out of biz by 1936. Many other makers ceased in the Great Depression of 1929-1936 or were re-formed with new investors later (Majestic, Fada, Garod, Silver-Marshall, others). By 1936 radio was once again a hot biz to be in and the big sellers were, in probable order: Philco (leading by a wide margin), then Zenith, RCA, Emerson and GE. Many smaller brands followed, including Grunow, Fada, Stewart-Warner, Stromberg-Carlson, Detrola and lots of "catalog" brands such as Silvertone (Sears), Truetone (Western Auto), Airline (Montgomery Ward), Air Chief (Firestone).

Beginning around 1934 there were several behind the scene "supplier" companies. These makers were mostly located in Chicago, but also in the east and also Los Angeles area. They made mostly cheap radios that had metal name badges applied with a couple tacks. This allowed the maker to put any name a client wanted onto the cabinet. The main supplier companies were these, in rough order of what I think their output was in the late 1930's:

1. Wells-Gardner, who made for Airline mainly.
2. Belmont, who made for Airline, Truetone
3. Warwick made Sky Rover, Truetone, Viking, Croyden, others
4. Detrola, who made most Truetone radios, some Silvertones, others.
5. Colonial, who made most Silvertone radios
6. RPC (Radio Products Corp) made Camden, Co-op, Crusader, others.
7. Climax made several brands
8. Clinton made MANY brands with names like Corona, Federal, etc.
9. Garod (made for Lafayette).
10. Echophone made some Air Chief
11. Consolidated Radio
12. Continental (later became Admiral)
13. Howard (along with Silver-Marshall, made Hallicrafters and others)

Then these Los Angeles makers:

14. Gilfillan
15. Pacific

On the "supplier" or "badge" brands you may find one of these clues:

1. If there is a "license tag" (being metal or a decal) on the back of the chassis, its NOT an RCA, GE or Westinghouse. This is because those companies owned the "Superhetrodyne" patent and the license tag is indicating the maker is paying a fee to the RCA/GE/Westinghouse group to use the Superhet circuit. These tags are on radios from 1935 to about 1941 near as I can tell. If you look VERY carefully, you might see a clue as to the maker on this tag. The Detrola-made radios say "Made by D.R.Co, Detroit" on them. What is important is any radio with a license tag is NOT an RCA, GE, Westinghouse, Atwater-Kent, Philco or Zenith. People often start reading the tag and think its telling them it IS an RCA, GE or Westinghouse, but its for sure not any of those, and Philco and Zenith had so much business that they never made any radios under other names.

2. If you have a "generic" looking dial, showing the earth, or a ship, or some such, with no name on it. it's a clue you have a "badge brand" made radio. Look for a scar on the cabinet where the badge might have been attached with two tacks.

OK, so how do you figure out WHICH of the above makers may have made your radio? Well you can go to the www.grillecloth.com site and put some tube types into the search engine there. Or you can search thru the "Radio Attic Archives" on line at pictures of the "supplier" brands. OR, look at the brands of tubes in the radio, sometimes they are the brand of the radio (such as "Kadette" or "Truetone".

These "badge brand" makers lasted up thru WW2, then made stuff for the war and got bought up afterwards or went into other product lines as the focus became **television** after the war and that was a TOUGH new gig. So, Detrola decided to fold up, so did others. Wells-Gardner went on to keep making for Airline (televisions, radios, phono stuff) on into the 90's. They made video gambling games, for casinos.

Once you begin to see the style of dials or parts on the chassis of one supplier company, you can identify others by that maker. The Wells-Gardner sets of the 1936-38 era feature little pointers in the dial to indicate tone and volume. So, if you see an Airline, or Truetone, or whatever, that has those little pointers set into the dial, it's a Wells-Gardner made radio. Other makers have similar "tells". Belmont made a lot of table radios with push-down lever buttons on the front and a side tuning knob. Belmont's larger sets had oval shaped dials 1936-38.

After WW2, many makers jumped in the game and quickly faded out. Some were large companies like Bendix Aviation, which needed someting to do after the war, but later decided consumer electronics was not as profitable to making stuff for the military. Many others were small, almost garage-based tiny companies that bought chassis from supplier makers then made some unique type of cabinet to fit them into. The 1946-1949 years had many unique, almost goofy radios such as the headboard bed radio, the lamp radios, radios made into end tables, etc. Brands include Mitchell, Dahlberg, DenChum. In 1955 along came Guild who made the famous "antique" fakes such as the wall telephone, treasure chest and more.

So knowing the main supplier makers, looking at images of those brands, what tubes are in it and knowing what brands your radio is NOT, you can often figure out who might have made it and when.

(Arthur Godfrey, continued from page 17)

he spent hours every day listening to the radio and realized that, at its best, radio was personal. It was one person talking to another.

CBS executives Sam Slate and Joe Cook, in their book, *It Sounds Impossible*, said "listeners heard for the first time the casual, unhurried speech ... the ruminating, hesitant pace ... the purring growl that has since opened the doors to millions of American homes."

Godfrey was assigned the task of being part of the CBS team that covered President Franklin Roosevelt's funeral procession on April 14, 1945. Roosevelt had passed two days earlier at Warm Springs, Georgia, of a cerebral hemorrhage.

His tearful, sorrowfully sincere description of the passing of Roosevelt's casket brought to network brass the realization that this guy Godfrey could be big. *Arthur Godfrey Time*, which would run mornings for the next 27 years, debuted only two weeks and change later, on April 30, 1945.

No discussion of Arthur Godfrey would be complete without mention of his on-air firing of singer Julius LaRosa on October 19, 1953. LaRosa was one of the "Little Godfrey's," a group of entertainers that appeared with him daily and included vocalists Janette Davis and Frank Parker, the McGuire Sisters, the Mariners Quartet and the Chordettes.

Godfrey had initially heard LaRosa in 1950 in Pensacola, Florida, where the singer was serving with the US Navy.

LaRosa, in his two years on the show, had "gotten to be a great big name," Godfrey said; then, completely without warning, after LaRosa had sung, I'll take Manhattan, said, "that was Julie's swan song with us." He stated later that LaRosa had "lacked humility."

Later Godfrey fired his band leader, Archie Bleyer, when he discovered he and LaRosa had formed a recording company on their own and hadn't told Godfrey.

Arthur Godfrey's later years were not happy ones. His pilot's license was revoked and he developed lung cancer. He died in 1983.

But, to me, he'll always be the guy I welcomed, through a bedside Philco radio, into my home every day.

(FM, continued from page 16)

cathode resistor that will establish a large negative voltage on the control grid. This enables the limiter to go into cutoff and saturation easily which will clip the peaks of the incoming signal. So if you encounter what you think are low voltages in the limiter stage, regard this as normal. Treat this stage like an IF stage when servicing.

The last two stages I will cover are the ratio detector and the Foster-Seeley detector. They convert the changing FM signal into audio. At first glance the circuits look the same, but the Foster-Seeley circuit uses a choke and the ratio detector uses a third winding in the ratio detector transformer and there is an electrolytic capacitor across two resistors. The diodes in the Foster-Seeley circuit appear to be in parallel and in the ratio detector they appear to be in series. The Foster-Seeley detector depends on the limiter to remove unwanted AM interference whereas the ratio detector utilizes an electrolytic to remove unwanted AM interference. The obvious advantage of the ratio detector is that eliminates the need for a limiter stage and reduces the cost in building the radio, hence its popularity in tube radios. This stage gives very little trouble and about

Remembering Rob West

By Mike Dale

Rob West, KC8DDH, has passed away after a year-long struggle with ALS. Rob was both a Ham and a long time member and supporter of MARC.

I remember Rob with his wife Debbie, with a cluster of friends, near their VW camper in the parking lot one year at Lansing. The single card table had just a few items on it. Rob told me " It's a beautiful day. I'm not here to sell a lot of things, I'm here to see the friends and to support the club"

Another year, my 16 year old son came to a show. I was busy with my table, but I saw my son in deep conversation with Rob. Later my son told me that he had decided that he wanted a VW Beetle for his first car. Rob, who had a deep knowledge of all things VW, had been answering all of his questions about what would be the best one to buy. We did find that Beetle in Mississippi. We drove it part of the way home and towed it the rest of the way. Rob was and is a part of that "first car" story.

One of our long term club members was a guy by the name of Doug Houston. Many of you would have known him; he was truly a deeply knowledgeable radio historian and contributor to the club. Rob and his wife Debbie made the effort to make sure that Doug could get to our meets in his later years. They also looked after him and helped him in a million different ways.

When I think of these little stories, and what MARC means to me, it makes me appreciate Rob even more. He was a "good guy" who contributed to the sense of friendship that is the heart of our club. We will all miss him.

(FM, continued from page 22)

the only things I have had to do to them is change the electrolytic and an occasional bad detector transformer and a tube or two. There is very little current flowing in these detector/demodulator circuits, so there is very little stress on the components.

The audio circuits are usually straightforward so the only real difference is in the switching between AM and FM. The most common problem with the switch is that it is noisy when switching bands and cleaning normally takes care of that problem.

I just covered the very basics and what I would like to see is some of you experienced techs out there contributing your solutions to some problems covered in AM/FM radios that I didn't mention or may not have run across before. So let's hear from you!

(The Shop, continued from page 11)

tion system and to get that starting with our available plus 6 dBj signal, we need about a 30 dB gain. I thought about doing this with two amplifiers, one on the tower, and one in the office. I decided to go with a single amplifier in the office since I am not too keen on climbing a tower to replace a tube, nor am I keen on electronics exposed to the weather.

"Of course, this is not the whole story. I also had to be sure there would not be too much signal for the first television set. The first set does not experience the cable and feed through losses. So for channel 4 – the strongest signal we have plus 18 dBj, the received signal, plus 30 dB of gain minus 20 dB isolation loss, 3 dB splitter loss and about 2 dB of cable loss. This puts the channel 4 signal at plus 23 dBj at the antenna terminals of the television. This comes to 14000 microvolts, which is comfortably within the AGC range of the set. It is also well within the capability of the amplifier.

"Art, the beauty of all these calculations is that it is simple addition and subtraction and, since the reading refers to power I don't care about impedance. 6 dBj is 6 dBj on a 300 or 75-Ohm cable. I only have to worry about Voltage at the beginning and the end.

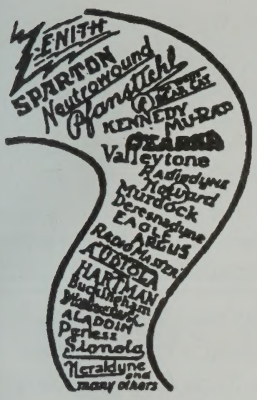
"All of the distribution hardware is already in the barn and I am expecting the 14 inch table televisions to be delivered on Thursday. I think we can run the coax under the eves at the back of the building and run the tap coax along the bottom of the baseboards in the rooms. We will get started on Monday with the cable runs."

Gerry had a knowing grin. "Boss, I don't think you have ever ordered 20 televisions at one time. That will be some shipment when it comes in."

"I must say, I got a pause and double take from our distributor when I called," Clem responded. "He did give me a good price for the quantity and, in fact, I ordered 22 of them. Those table sets are becoming popular and our customers are starting to install second sets, frequently in the master bedroom. I guess that way they can get ready for bed and then watch the Jack Parr show. That also means we will have to do some dB calculations at those installations to make sure they still get good pictures on both sets. And for you, Art, I expect it won't be long before we get kitchen television sets as well."

Art shot Clem a dirty look and everyone went back to work. Clem checked calibration on the meter and found that the calibration was fine – no adjustments were required. He called George and the meter was out the door within half an hour. George thanked Clem for the repair and commented that the wiring portion of the cutover was still in process, so the meter would be available in plenty of time.

I sat back in the chair and decided it was a time to take a stretch and re-fill my coffee. As I walked downstairs I decided to dig out my old slide rule to see if I could duplicate Clem's calculations. I was also glad, these days, for dB calculations I can simply use a pocket calculator or even the calculator on my phone.



The Classified Ads

As a MARC member, you are entitled to one FREE posting per issue. Please e-mail your ad to the address below, or snail-mail a legibly written ad to: Steve Enzer, Editor, MARC Chronicle, 12740 Monroe Pike, Brooklyn, MI 49230. E-mail: enzer@binsys.com.

Please note that ads for the Fall issue are due by August 1st.

REPAIR SERVICE: I repair old tube type radios. Have stock of old type tubes and parts. Paul Colosimo, 19111 Wood St., Melvindale, MI 48122. 313-928-3780, 313-928-3322 (office).

REPAIR SERVICE: I repair all tube type radios. I have most parts and tubes in stock. Dan Schnaidt, 325 Milton Ave., Battle Creek, MI 49017, 269-282-1324 (home), 734-417-6995 (cell).

FOR SALE: ARBE-III, Universal Battery Eliminator, $159.95 + $15 S/H. Michigan residents, please add $9.00 sales tax. The ARBE-III is designed to provide the power requirements for most pre 1930's battery operated radios. The custom wound power transformer provides 3 electrically isolated supplies (A, B, C) which are all regulated and short circuit proof. Comes assembled, tested and with a full five year warranty. Please refer to our website at www.arbeiii.com for direct purchase using PayPal. You can contact me at 517-787-2985 for details on money order or personal check payments. We are also offering custom wound audio transformers for early radios. $19 each or $20 each for the center tapped version plus S/H. See our website for other items offered. You can reach me at arbeiii@yahoo.com.

FOR SALE: PARTS! We have a full stock of radio supplies, including capacitors, tubes, knobs (including our two types of real wood repros!) , bulbs, tube shields, etc. Our two specialties: repro radio dials (we bought the former Clint Blais repro dial business in 2003, and they are still the best!) and we can duplicate or repair most old volume or tone controls. Phono needles, carts and wheels too. Email any wants or see our website at www.oldradioparts.net Over 30 years servicing radios here! Mark Oppat mop-pat@comcast.net 253 Blanche St, Plymouth, MI 48170 734-455-4169 11am-9pm most days.

FOR SALE: Reproduction radio dial belts and dial cord to fit all radios. Bronze tuner cable for early RADIOLA models. Tuner repair kits for many ATWATER KENT radios. Complete details at www.Adamsradio.com. Adams Manufacturing Company, PO Box 1005, Lincoln Park MI 48146.

FOR SALE: 1% Precision tolerance 500V silver mica capacitors and **1% Precision** 630V tubular axial PSA polystyrene film capacitors. Also for sale are 1000 Volt silver mica capacitors available in many different pF sizes. All capacitors are new production. For price list and product info, please contact Dave Cantelon, 6 Ferncrest Gate, Scarborough, Ontario, Canada, M1W 1C2 ; phone 416-502-9128; Email: justradios@yahoo.com or visit WebSite: www.justradios.com

FOR SALE: – Repro Antique Radio Dial Covers – Mark Palmquist - Retro Radio Repair www.dialcover.com 5033 Arbor Ln, Lilburn, GA 30047 (770) 923-8929 jmpalm@mindspring.com

FOR SALE: Phono and tape recorder wheels, belts. Phono needles, cartridges, 45 adapters, centerposts for all brands. Our specialty: massive inventory of V-M Factory Service parts, manuals. Also buy same for stock. Visit www.thevoiceofmusic.com or email info@thevoiceofmusic.com with what you have or what you need. Phone (248) 478-0990 before 7pm weekdays, Saturday until 2pm. Gary Stork, 37530 E. Meadowhill, Northville, MI 48167

FOR SALE: Radio grommets, washers, and other rubber parts, repro knobs, push buttons, NOS and repro clock radio knobs, Motorola VT71/73 T.V. masks and knobs, and more. See them all at www.renovatedradios.com. Ed Schutz: blacksmith@renovatedradios.com (586) 697-6153.

FOR SALE: 1955 Lowery Double Key Board Electric Organ with beautiful Mahogany Cabinet, 55 tube unit, very powerful in its day, $400.00 selling as is. Variety of older ham tube equipment. Quite an assortment of ham magazines, 1970-1990s. Battery radios from 1920s, no horns but complete. Variety of transmitting tubes: 807, 866, 832, 815 etc. Portable Bakelite and wooden TVs early 1950s. WANTED: Kennedy console or table model radio. Can be rough needing work or restored if price is right. Phone Gary Clayton, The Olde Tyme Radio Centre, Belgrave, Ontario, Canada NOG 1E0, 519-357-4304, oldetymeradio@tnt21.com, http://www.oldtymeradio.ca/.

FREE: Heathkit GR 2000 television set. This is the ultimate Heathkit TV from 1979 and it was working when I parked it. It does not have a cabinet. I will also include a spare CRT. Just pick it up and it is all yours. Located in the Detroit metro area call or text me at 248 202 2175. John Reinicke

WANTED: Reuben Smith 5-tube TRF battery radio manufactured in Lansing, MI circa 1925. I traded this radio off to Oran Sauder (RIP) maybe 20 years ago. My radio had a glass front panel as well. Any assistance in relocating this radio for my personal collection would be greatly appreciated. Jim Clark, 517-648-2785 or jc072651@aol.com. Thank you.

FOR SALE: 1924 All American Mohawk model 100 battery set, excellent condition $95.00; Resas Tone A Dyne battery set $65.00; 1933 Philco Cathedral model 66 $45.00; 1937 Philco Cathedral model 37-61 $35.00; 1931 Gloritone Cathedral $60.00; 1938 Philco model 38-62 $28.00; Zenith Console model 8A02 $50.00; National NC-303 clean with manual $85.00; 2 Hallicrafters S41G $25.00 each or both for $40.00; Zenith Semi Truck $20.00; Monarch TM-18 Dynamic Mic $15.00; Other misc radio's wood, plastic, transistor, price $2.00 to $30.00; Misc Test Equipment CHEAP; Radio Literature and other radio related items. Pick up only. Alan Reed, 2875 Geneva Hwy, Manitou Beach, MI 49253. 517-547-7570 Evenings.

FOR SALE: My collection of radios. Send large SASE for list. All in good condition and working. Robert Rossi, 10936 Melbourne Ave, Allen Park, MI 48101, 313-386-8321.

WANTED TO BUY: Your old capacitors, new or used (prefer with leads). All types: Wax, plastic, molded, striped, metal shell, disc, etc. These can be from your radio restorations, junk box, or vintage 1940-70s new old stock. Will pay shipping as well, or I can pick up in Kalamazoo at Expo 2017. Dan Gutowski 734-718-7450 email: dg16ms26@msn.com

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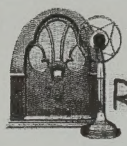

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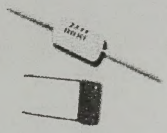

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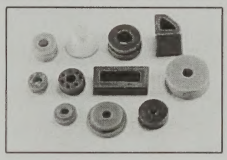

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Call for Articles

Your editor is always looking for new articles. Many of our readers have indicated a preference for articles related to collecting, as opposed to highly technical pieces. Of particular interest are personal accounts of a particular restoration you might have done, or historical accounts related to our hobby. But all subjects related to vintage electronics are welcome.

If you have an idea please feel free to discuss it with me, either by phone or email.

Steve Enzer, MARC Chronicle Editor, enzer@binsys.com. 517-592-2841

Paid Ads Accepted

The *Chronicle* accepts paid **business card sized ads**. The ad may be in the form of your business card, or other text/graphics of business-card size. All submissions must be camera-ready. We will not do any typesetting, but simply copy what you send us. Also, your ad can appear on the MARC website at no extra charge.

Rates: $10 per single issue, $35 per year (four issues).

Please send all submissions to:
Steve Enzer, MARC Chronicle Editor,
12740 Monroe Pike, Brooklyn, MI 49230
Enclose a check for correct amount payable to MARC.

The Mystery Radio Identified!

Remember the mystery radio photo sent in by Don Pehlke in the last issue? Mark Oppat identified it as a Lafayette D-58 or D-59. Mark was kind enough to share his knowledge of radio identification in his article on page 18.

Photos from previous EXTRAVAGANZAS